A SURVEY OF NEMATODES OCCURRING IN LYALLPUR FRUIT PLANTS NURSERY SOILS

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Nematodes isolated from three hundred soil samples collected from Nursery soils in the vicinity of Lyallpur belonged to the following 20 genera : *Aphelenchus Acrobeloides, Criconemoides, Cervidellus, Dorylaimus, Discolaimus, Hoplolaimus, Helicotylenchus, Hemicycliophora, Longidorus, Macrotrophurus Mononchus, Psilenchus, Pseudacrobeles, Rhabditis, Tylenchus, Tylenchorhynchus, Trichodorus* and *Xiphinema*. Among these, *Dorylaimus* sp., *Acrobeloides* sp., *Helicotylenchus* sp., *Xiphinema* sp., *Aphelenchus* sp., *Tylenchus* sp., *Rhabditis* sp., and *Hoplolaimus* sp., constituted major portion of the nematode population of Lyallpur soils.

INTRODUCTION

It is well known that nematodes have presented some of the most serious pest problems encountered in the agricultural economy of even advanced countries like U.S.A., Canada and Australia. According to Thorne (1961), condemnation of nursery stock and seedling nursery plants, because of only one root-knot nematode (*Meloidogyne* sp.) accounts for more loss than all other diseases combined. Sugarbeet industry of Germany suffered heavily during the 19th century on account of depredations of the cyst nematode, *Heterodera schachtii* (Thorne 1961). The yellows disease of pepper (*Piper nigrum* L.) took a toll of almost 20 million trees on the island of Banka in Indonesia. The disease was later reported by Hurbert (1957) to have been caused by the burrowing nematode, *Radopholus similis*.

In West Pakistan, ear-cockle disease of wheat caused by *Anguina tritici* (Milne, 1919), is known to take a heavy toll of our staple food crop every year. Besides, there are many nematode diseases of crop plants in the country, the real losses caused by them have not been studied. This paper only gives a preliminary report on the occurrence of nematodes in a small section of oursoils.

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MATERIALS AND METHODS

Three hundred soil samples were collected from different nursery soils in the vicinity of Lyallpur. Most of soil samples were taken from the nurseries growing diseased fruit and ornamental plants, while other samples were taken from nurseries growing apparently normal plants. Spots were selected at random and each sample consisting of the entire soil mass within 1 x 1 x 2 feet strata was collected. The soil samples thus obtained were thoroughly mixed and a representative sample of soil weighing about 1000 gms, was taken from each lot for further examination.

Nematodes were isolated by means of Cobb's (1917) sifting and gravity method. This method proved better than other methods in preliminary trials. Nemas were collected from filtrates after 8,16 and 24 hours and these filtrates were finally mixed. Nematodes thus isolated were immediately separated from *Mononchus* sp. as the latter is known to devour certain other species of nematodes when present in mixed populations (Thorne, 1961). Bamboo needles were used for picking individual nemas from the mixed populations. Nematodes were kept in small petri dishes for a few days, changing fresh water and were later processed for microscopic examinatoin.

Live nematodes were killed in 0.1 per cent Lugol's solution (Iodine, 0.1 gm; potassium iodide 0.2 gm., distilled water, 100 ml). After the nemas had relaxed they were transferred to the fixing solution, (Formalin 10 ml; glacial acetic acid 1 to half ml; distilled water 100 ml.). Nematodes thus fixed were transferred to glycerine ethanol solution (Ethanol-96 per cent 20 parts: glycerine, 1 part; distilled water 79 parts) and were kept at 40°C. Processed nemas were then mounted in pure dehydrated glycertne on micro-slides and were sealed with nail polish. Lactophenol was also used as a mounting medium for certain specimens which also proved equally satisfactory. (Phenol crystals 20 gms; Lactic acid 20 gms; Glycerine 40 ml; distilled water 20 ml.).

Nemas requiring immediate examination were mounted temporarily as follows; Nemas were picked up with a bamboo needle and transferred to a drop of distilled water placed on a clean microslide. The slide was then gently heated over a flame in order to kill the nemas before mounting. Care was taken to avoid overheating and cooking of the specimens. The relaxed specimens were then transferred to 3 per cent glycerine solution for about 2-3 weeks.

RESULTS

Nematodes isolated from 300 soil samples were identified up to the generic level and the number of samples from which different nematodes were isolated was noted (Table 1). The nematodes belonged to 20 genera comprising : *Aphelenchus, Acrobeloides, Criconemoides, Cervidellus, Dorylaimus, Dorylaimellus, Discolaimus, Hoplolaimus, Helicotylenchus, Hemicycliophora, Longidorus, Macrotrophurus, Mononchus, Psilenchus, Pseudacrobeloides, Rhaoditis. Tylenchus, Tylenchorhynchus, Trichodorus* and *Xiphinema*.. The species of *Dorylaimus, Acrobeloides, Helicotylenchus, Xiphinema, Aphelenchus Tylenchus, Rhabiditis*, and *Hoplolaimus* were isolated from more soil samples than the other nemas. On the other hand species of *Pseudoacrobeloides Psilenchus, Macrotrophurus, Dorylaimellus, Criconemoides, Cervidellus, Discolaimus* and *Hemicycliophora* were isolated from few samples.

Soil samples taken from the experimental fruit garden, University of Agriculture, Lyallpur yielded most of the above mentioned nematodes. Among the nematodes thus isolated, species of *Tylenchus, Psilenchus, Tylenchorhynchus, Criconemoides, Hoplolaimus, Helicotylenchus, Hemicycliophora* and *Trichodorus* are note worthy.

DISCUSSION

Nematodes isolated from 300 soil samples comprised both plant parasitic and free-living nematodes. Species of *Dorylaimus, Acrobeloides, Helicotylenchus, Xiphinema, Aphelenchus, Tylenchus, Rhabiditis* and *Hoplolaimus* constituted the major population of nematodes in Lyallpur nursery soils. Similar results have been reported by Taylor *et al*, (1958) from U. S. A.

Hoplolaimus coronatus is one of the plant parasitic nematodes isolated from Lyallpur nursery soils. Krusberg and Sasser (1956) isolated *H. coronatus* from the rhizosphere of cotton plants which was observed to cause slight stunting in young cotton plants. Species of *Helicotylenchus* are fairly numerous in our soils. Similar results have also been reported by Hopper (1958) and Van Gundy (1957) who found this nematode associated with gall like terminal growth on roots of rough lemon, *Citrus limon* in California. Similarly, *Tylenchorhynchus cylindricus* has been reported to cause appreciable stunting of cotton plants in Arizona (Reynolds and Evans, 1953).

TABLE 1: *Showing the distributions of Nematodes in Lyallpur Nursery soils (50 samples examined from each place)*

Genera	Experimental area Sq. No. 21, 22.	New Fruit Expt. Garden Sq, No. 39	Old Fruit Expt. garden Sq. No. 9	Botanical garden nursery	Punjab nursery	Evergreen nursery	
	Time encountered	Time encountered	Time encountered	Time encountered	Time encountered	Time encountered	Average
Aphelenchus	9	15	23	5	6	2	10.0
Acrobeloides	25	18	32	30	23	22	25.0
Criconemoides	2	—	—	—	3	2	1.2
Cervidellus	5	—	—	2	1	1	1.5
Dorylaimus	40	23	25	34	42	16	30.0
Dorylaimellus	—	1	1	4	—	—	1.0
Discolaimus	2	—	4	3	—	—	1.5
Helicotylenchus	18	12	21	5	14	20	15.0
Hoplolaimus	7	3	10	6	5	15	7.3
Hemicycliophora	—	3	5	—	—	2	1.6
Longidorus	5	7	6	—	3	4	4.1
Macrotrophorus	—	—	2	—	3	1	1.0
Mononchus	2	1	—	—	5	—	1.2
Pseudacrobeles	1	—	—	2	—	—	0.5
Psilenchus	—	2	—	3	—	—	0.8
Rhabditis	5	3	4	1	4	2	3.2
Tylenchus	7	5	6	10	9	8	7.5
Trichodorus	2	8	5	4	—	3	3.6
Tylenchorhynchus	5	6	10	15	3	6	7.5
Xiphinema	10	14	15	9	12	13	12.2

Trichodorus sp. is fairly abundant in our soils. It has been reported to cause severe damage to vegetable crops in Florida (Crhistie and Perry, 1951). *Xiphinema index* is also widely distributed in our soils. This species was observed as vector of a soil-borne virus which causes Fanleaf disease in grapes in California. (Hewett *et al* 1958)

LITERATURE CITED

Christier J.R. 1951 The feeding hbits of plants parasitic nematodes. Fla. Sta. Hort. Soc. 64: 120—122.

Cobb, N.A. 1917 Notes on nemas. Contrib. Sci. Nematode, 5 : 117—128.

Hewett, W.B., D.J. Raski and A.C. Goheen. 1958 Nematode vector of soil borne fanleaf virus of grapevines. Phytopath. 48 (11): 586—595.

Hurbert, F.P. 1957 Diseases of some export crops in Indonesia. Plant Dis. Reptr. 41: 55—64.

Hopper, B.E. 1958 Plant parasitic nematodes in Southern forest Nurseries. Plant. Dis. Reptr. 42 (3): 308—314.

Krusberg, L.R., and J.N. Sasser. 1956 Host parasite relationship of the Lance nematode in cotton roots. Phytopath. 46 (9): 505—510.

Milne, D. 1919 The nature and history of ear cockle, *Tylenchus scadens* in wheat and its treatment. Bull. of Dept. of Agri. Pb. No. 1, Botanical Series 1—5.

Reynolds, H.W. and M.M. Evans. 1953 The stylet nematode, *Tylenchorhynchus dubius* a root parasite of economic importance in Southwest. Pl. Dis. Reptr. 37 (11): 540—544.

Taylor, D.L., R.V. Anderson and W.A. Haglund. 1958 Nematodes associated with Minnesota crops preliminary survey of nematodes with Alfalfa, Flax and Soybeans. Pl. Dis. Reptr. 42 (2) : 195

Thorne, G. 1961 Principles of Nematology, McGraw Hill, 1961, Pages 41—509.

Van Gundy, S.D. 1957 The first report of species of *Hemicycliophora*, attacking citrus roots. Pl. Dis. Reptr. 41 (12) : 1016—1018.